Quack cancer cures or scientific remedies

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Hypothesis—struck like sparks from unaccountable hunches or quirks of the mind from an idiosyncratic penchant for the pleasing form or agreeable order[1].

People are conservative, biased, judgmental, selfish and forgetful, hence the need for good trials to increase their belief in what exists and not in what they might imagine[2].

It is well to consider the two quotations above in juxtaposition. They paraphrase the vital components of the scientific process—namely, hypothesis generation and hypothesis testing. The hypothesis that sparks from unaccountable hunches and achieves a pleasing form or agreeable order is not neutral but is an act of creation. That is why scientific logic demands severe tests of our dearly beloved hypotheses.

With that preamble I propose to speculate on the demarcation between alternative and orthodox medical approaches to common medical problems; and in doing so I must acknowledge my debt to Petr Skrabanek, who introduced me to the writings from the Age of Enlightenment that contributed to his self-confessed 'scepticaemia'.

THE DEMARCATION BETWEEN ORTHODOX AND ALTERNATIVE MEDICINE

Table 1 is an incomplete lexicon of unproven methods of cancer diagnosis and treatment. What do all these approaches have in common that they should stand as an alliance in competition with orthodox therapy?

A common claim for methods of alternative medicine is that they are 'holistic'. Certainly many of these methods do have a comprehensive health belief system that links the various components of the body and spirit together as a whole. Yet these belief systems are mutually exclusive. For example, acupuncture, osteopathy and homoeopathy in theory should be in competition with each other. Yet it appears that many proponents of alternative medicine feel free to pick and mix from amongst a large compendium of ancient or ethnological remedies without paying too much concern to their metaphysical or quasi-physiological underpinning.

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In contrast, orthodox medicine is vilified as 'reductionist'. Yet a modern understanding of the physiology and biology of the human body might reasonably be described as holistic. The view of the human body as a complex structure recognizes that the cell is a beautiful expression of the integration of activities of a variety of subcellular organelles, with a cell having activity greater than the sum of the parts. Cells can exist on their own in tissue culture or in partnership with other cells to form metabolic or secretory elements that are formally arranged into an organ. The organ is an integrated structure with its own set of functions that it can perform *ex vivo*, yet *in vivo* it is integrated at the next level up the hierarchy. The whole aggregation of organs can be orchestrated via the brain through neuro-endocrine immunological pathways, where once again the whole is greater than the sum of the individual parts. At an even higher level, individuals band together into tribes and cultural groups who share a history and a common subconscious. This hierarchical system of organization, as I see it, is an exquisitely integrated and comprehensive model of nature; furthermore, it is an open system constantly available for improvement or enlargement as our knowledge increases. This imperfect model can be studied, measured

Table 1 **An A to Z of unproven methods of cancer diagnosis and treatment**

A	Aromatherapy, acupuncture	N	Negative ionizers
B	Bach's flower remedy	O	Osteopathy, organic diet, orgone accumulators
C	Christian science, chiropractic, crystal healing, carrot juice	P	Psychic surgery, psionic medicine, pyramidology, Pauling's vitamin C cure
D	Dousing	Q	Quinine
E	Vitamin E, electroacupuncture	R	Radionics, reflexology
F	Faith healing, fire walking	S	Simonton's cure, selenium
G	Gerson therapy	T	Theosophy, tai chi, trepanation
H	Homoeopathy, herbalism	U	Urine therapy
I	Iscador, iridology	V	Vrilium tubes, vegatest
J	Johnson's remedy	W	Water remedy
K	Krebiozen	X	Xanthine remedy
L	Laetrile	Y	Yoga
M	Moxibustion	Z	Zinc, zebethium occidentale

and perturbed. Messenger RNA, autocrine and paracrine growth factors, cytokines and hormones can have their messages decoded and quantified both in health and in disease. In many cases we can restore the body to health by correcting perturbations of these 'natural humours' and the burgeoning new biology and the decoding of the human genome open up infinite possibilities for control and cure of disease in the future.

In contrast the belief systems of the popular alternative remedies are closed systems with the received wisdom handed down by sages of the past, codified for all time. I therefore find it particularly galling when orthodox medical scientists are branded as having closed minds whereas proponents of alternative medicine are supposed to have open minds. As Petr Skrabanek once wittily stated, 'some minds are so open their brains slide out'. If the word 'holistic' cannot be the link between these competing belief systems then I would like to suggest what they have in common is the obsolete epistemology of Aristotelian inductivism.

THE POVERTY OF INDUCTIVE LOGIC

This approach demands the elaboration of an hypothesis concerning the nature of illness and the therapeutic sequelae of the health belief system. It is an advantage if this hypothesis dates back to antiquity so that its original proponents may be cloaked with the ancient wisdom of the sages; in other words, men who have been dead hundreds or thousands of years are assumed to have been wiser and more in tune with reality than men and women who are alive today.

The inductivist takes these ancient belief systems, applies the remedies and collects corroborative evidence that the interventions are influencing the natural history of the disease. Placebo effects and the natural variation of nonspecific or chronic conditions are ignored. Thus, the proponents of alternative remedies produce only anecdotal evidence to support their claims. Their publications are of two types—the first an elaboration of the hypothesis, or why a particular intervention may cure cancer, and the second a collection of anecdotes describing the successes of this approach. They may describe, for example, a series of 50 patients with advanced cancer who have been given only 6 months to live by the orthodox medical profession and who are then prescribed a complex regimen involving diet, massage, enemas, physical exercise and auto-visualization. Some patients may fail to adhere to the regimen and do not survive long, whereas others, who adhere strictly to the regimen, live much longer than 6 months.

The flaws in this approach should be self-evident. First, patients are never told that they have only 6 months to live, though the notion is sincerely and rigidly held among the lay public, thanks to constant reinforcement by novelists and scriptwriters. It is possible to define a group of 50 patients whose median expectation of life is 6 months, but some of those patients may live 3 years despite the dire prognosis for the group as a whole. Secondly, the inability to adhere to a strict regimen might in itself be symptomatic of a poor prognosis. By picking out the success (i.e. the numerator of the series) and ignoring the failures (i.e. the denominator), it is possible to convince others that any plausible or even fantastic intervention can lengthen survival in cancer.

WHAT IS THE ALTERNATIVE TO ALTERNATIVE MEDICINE?

The alternative to alternative medicine should not be described as 'orthodox' or 'Western' medicine, since this excludes unorthodox or Eastern medicine. A demarcation must be made between the irrationalism described in the first section of this paper and the rational approach. Rationalism, our cherished legacy from the Age of Enlightenment, should follow naturally from all challenges to dogma, and should embrace twentieth century developments in scientific philosophy. The hazards of the inductive approach to knowledge were exposed by the great philosophers of the past two centuries; and the progress achieved in medicine this century can be ascribed to a flowering of reason, under the guidance of philosophers such as Bertrand Russell, Karl Popper and Thomas Kuhn.

The modern scientific process distinguishes itself from primitive inductive thinking by embracing a hypothetico-deductive pathway. Medical scientists of today are a little more intellectually honest, or for that matter, intellectually modest than their forebears. They build their hypothetical models of disease processes and develop rational therapeutic sequelae; and, in contrast to the inductivist, they do not believe they have gained total insight. Moreover, they can accept that other 'sages', faced with the same data, may construct a different model with its own therapeutic sequelae. Thus develops a thesis and an antithesis. The deductivist is also an experimentalist. He designs his studies so that the thesis and the antithesis are challenged head on and by an evolutionary process (based on the availability of experimental data): only the fittest is allowed to survive. In other words, a modern medical scientist holds up his theories to scrutiny and, when data emerge to falsify his claims, he embraces the data and rejects the theory.

HISTORY OF THE TREATMENT OF BREAST CANCER, THROUGH THE EYES OF A 'PHILOSOPHER'

In the Edwin Smith medical papyrus breast cancer was described as a separate entity. An ancient Egyptian physician advised that the disease should be left alone—good advice at

the time, yet difficult to follow, as the next 3000 years were to demonstrate.

The ancient Greek philosophers, notably Aristotle, developed a 'holistic' model of the body in health, as a fine balance of natural humours. Disease processes were ascribed to an imbalance leading to an excess of one of these natural humours. Cancer was asssumed to be a coagulation of black bile (melancholia) within the affected organ. Galen (130–200 AD) codified this belief system and developed its therapeutic consequences. If breast cancer was due to an excess of black bile, then the body must be drained of this excess by venesection, purgation, leeches and special diets. For 1600 years, the Galenic doctrines were dominant in Western Europe and to have challenged them would have been heresy. Some patients lived for a remarkably long time despite these therapies and were cited in support of the treatments. During this long period of history, surgery was not completely neglected, but it often consisted of simple curettage or cautery for ulcerated lesions. In desperation an occasional woman subjected herself to a mastectomy, but in the days before antisepsis or anaesthesia most died of sepsis or shock. The first documented long-term survivor was a young nun at L'Hôtel Dieu in Quebec who, after mastectomy in 1700, lived for 30 years and became Mother Superior of the convent[3].

From the time of the ancient Greek philosophers to the Age of Enlightenment in Northern Europe, an inductive philosophy determined health belief systems and their therapeutic consequences. It was not until the middle of the last century that Galenic doctrine was challenged. The futility of venesection for inflammatory diseases was documented by Louis in 1836, and the cellular theory of cancer was elaborated by Virchow in the 1840s. Virchow postulated that cancer arising within the breast grew along lymphatic channels, and that the regional lymph nodes acted as filters, providing a temporary arrest of the growth and representing a first-line system of defence. In support of his belief in the centrifugal spread of the disease he drew attention to the fact that, in women who were dying of advanced breast cancer, the skin and the bones in the trunk were heavily involved but seldom the distal limbs.

Before the end of the last century, Halsted in Baltimore and Handley in London had performed the first successful radical mastectomies. The radical operation was based on the belief that the disease remained localized within the region of the breast and its lymphatic drainage and that the skilled surgeon could remove every cancer cell. This, sad to say, was not the case. Halsted's collected series, published in 1932, showed a 10-year survival of only 12%, although his operative mortality was remarkably low and the control of local recurrence was better than that reported previously by any surgeon[4].

By the 1920s surgeons had become deeply frustrated by the lack of progress in treatment of breast cancer. But, instead of challenging the assumptions underlying the radical approach, they argued that it had not been taken through to its logical conclusion. Some surgeons advocated even more radical operations, which included a cervical dissection (something that Halsted himself had recommended in 1897) together with an attack on the mediastinal nodes; others turned to the infant specialty of radiotherapy to achieve these aims by irradiating the subclavicular and supraclavicular fossae, the parasternal region and the chest wall. But still patients died. When a large series of patients treated by conventional radical regimens in Cambridge in the late 1940s and early 1950s were followed up for 25 years, the cure rate was only 30% for even the most favourable stages of disease[5].

By the 1960s, the 10-year survival for breast cancer following radical treatment was almost 50% compared with the 10% achieved by Halsted at the turn of the century. The fact that surgeons were now better at selecting cases, with the staging systems described in the 1940s, was conveniently forgotten, and the improvement was ascribed to increasing surgical skill. Failures were dismissed as the results of poor surgical training and a failure to remove or irradiate the cervical and mediastinal nodes. There was also the unwritten assumption that the patients who survived 25 years after radical mastectomy would have died much earlier without the surgical intervention—an example of the inductive reasoning espoused by Aristotle and Galen. Is it possible that patients could live without treatment for 25 years? Certainly I have encountered elderly women with advanced breast cancer who have had the disease for many years, some of whom refused surgical treatment when offered it in the early 1960s. Although it is virtually impossible to find a large series of patients with untreated early breast cancer in which to study the natural history of the disease, my own studies of this subject suggest that 20%–30% of patients presenting with the earlier stages of the disease could survive in symbiosis with their cancer for a long period[6].

TWENTIETH CENTURY PHILOSOPHY AND THE MODERN TREATMENT OF BREAST CANCER

The above historical sketch illustrates how, into the 1960s, the development of treatment for breast cancer was inhibited by a philosophical approach that was 2000 years out of date. As Karl Popper wrote in 1968, 'Instead of discussing the probability of the hypothesis we should try and assess what trials it had withstood and how far it has been able to prove its fitness to survive'[7].

Then, at last, clinicians began to acknowledge that the 100-year-old hypothesis was no longer fit to survive. But what was to replace it? Clinical scientists and surgeons went

back to the laboratory. Elegant experimental models were developed in syngeneic mice with transplantable tumours, and the dogma of Virchow was challenged. Very rapidly, it was demonstrated that cancer did not behave according to a simple mechanistic centrifugal model. Cancer cells could bypass the lymphatic system and gain access to the vital organs through early invasion of the venous system. Furthermore, the lymph nodes were not filters. Cancer cells could transgress them with impunity or, alternatively, could be destroyed through an immunological mechanism generated by the lymphocytes and histiocytes. Therefore an alternative model was developed in which biological variables were added to chronological and anatomical factors. It was argued that, at one extreme, there are biologically favourable tumours with low capacity to invade in patients who are immunologically intact; these patients have an excellent prognosis and might be the ones with the 25-year natural history. At the other extreme there are the biologically aggressive cancers existing in immunocompromised patients; these would have disseminated before diagnosis was clinically possible, with an outcome unrelated to the extent of local therapy. As a shorthand, I will describe this model as 'biological predeterminism'. However, the replacement of one biological hypothesis with another is not in itself a scientific process. Deductive science suggests experimentation in an attempt to falsify these revolutionary beliefs. A conceptual shift that contains within it two therapeutic sequelae is necessary. First, if the outcome of treatment is predetermined by the extent of dissemination at the time of diagnosis, the magnitude of local therapy is unlikely to influence survival, and surgery that leads to the retention of the breast (i.e. breast conservation) should produce the same survival advantages as more radical surgery aimed at ablating the breast and regional lymphatics.

The second therapeutic sequela addresses itself to the needs of the patient with early subclinical dissemination of the cancer, which can account for the late distant recurrences of the disease despite adequate local therapy. For these patients, the only way to improve survival is by delivering systemic therapy at the time of local surgery. To challenge these beliefs according to a twentieth century scientific paradigm requires randomized controlled trials, which are the clinical expression of the hypothetico-deductive approach.

Over the past 25 years, surgeons worldwide have organized themselves into collaborative groups. Initially these groups addressed themselves to the issue of the extent of local therapy. The results of these trials are now mature and show with statistical confidence that the extent of local therapy does not influence survival. There are certainly differences in local relapse rates and physical morbidity, but women presenting with favourable stages of the disease can now be spared mastectomy[8].

These collaborative groups have also addressed the question of adjuvant systemic therapy and, without going into the pros and cons of chemotherapy and endocrine therapy, we can now say with extreme statistical confidence that the appropriate use of these agents will lead to a 25% reduction in the annual rate of relapse for at least a 10-year period, and a modest reduction in breast cancer mortality of 10%[9]. In Europe one million new cases of breast cancer are expected over the next 5 years, and this translates into potential benefit for 100 000 women.

The 10% reduction in mortality from breast cancer is not the end of the story but the beginning. Throwing off the shackles of antique philosophy has led to the development of new therapeutic tools, and in turn to longer and better quality survival. Furthermore, the insights into the disease that have arisen from this work have led to the design of trials for the prevention of breast cancer[10].

ONCOLOGICAL HUBRIS

As a result of these advances we are beginning to hear sounds of triumphalism. Yet, on my own reading of events, progress has slowed down if not come to a halt. In response to their frustrations many clinicians are arguing for intensification of existing treatments—high-dose chemotherapy with bone marrow transplant or stem cell rescue—and once again we read anecdotal reports and historically controlled series to support these very aggressive regimens. The germ of inductivism is once again infecting the body of orthodox medicine. At the other extreme is the obsession with screening of well women, which is based on a model reincarnating the teachings of Virchow 150 years ago. Although I accept that a more intensive approach might produce modest benefits in a narrow age band, the uncritical extension of these programmes is now damaging the lives of many women, as Petr Skrabanek described in *The Death of Humane Medicine*.

Open-minded clinical scientists will recognize the limitations and inconsistencies of the contemporary model and search for logical evolutions or even radical revisions that might lead to the next paradigm shift. For example, I share Schipper's view that the putative micrometastases present at the time of diagnosis are not autonomous clumps of cells expanding at a pre-determined rate but complex organisms surviving in a state of dynamic equilibrium[11]. This equilibrium could easily be perturbed, perhaps even by the act of surgery, and inappropriate chemotherapy might destroy some of the growth control mechanisms. So perhaps our attempts to cure should be modulated and our ambitions should be limited to control. Thoughts such as these might allow us to develop the next anti-thesis, with a further approximation to the truth and the next incremental improvement in survival. Meanwhile we can enjoy a small

sense of satisfaction by observing the brisk fall in breast cancer mortality in the UK since 1985, which coincided with publication of the world overview of adjuvant therapy for early breast cancer[9].

CONCLUSION

It is ironic that increasing numbers of the public are turning their backs on medical science at the very time when they should be embracing it. I would be the last to ignore the needs of my patients for physical comfort and spiritual solace, and I believe that there is much that we can learn from complementary medicine to make our patients feel better while our science attempts to make them get better. I also passionately believe in a partnership between the profession and groups that provide spiritual support for our patients. However, to encourage the terminally ill to spend the last few precious months of life chasing the false promise of a cure is as cruel as it is intellectually dishonest.

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REFERENCES

1 Theodore Roszak. *Where the Wasteland Ends.* New York: Doubleday, 1973:142

2 Vere D. Controlled clinical trials: the current ethical debate [Editorial]. *J R Soc Med* 1981;**74**:85–8

3 Vallee A. *Un biologiste Canadien: Michel Sarrazin 1659–1735.* Quebec: LS-A Proulx, 1927

4 Lewis D, Reinhoff WF. A study of the results of operations for the cure of carcinoma of the breast performed at the Johns Hopkins Hospital from 1889–1931. *Ann Surg* 1932;**95**:336–49

5 Brinkley D, Haybittle JL. The curability of breast cancer. *Lancet* 1973;**ii**:95–8

6 Baum M. The curability of breast cancer. In: Stoll BA, ed. *Breast Cancer Management—Early and Late.* London: Heinemann, 1977:3–14

7 Popper KR. *The Logic of Scientific Discovery.* London: Hutchinson, 1968

8 EBCTCG. Effects of radiotherapy and surgery in early breast cancer, an overview of the randomized trials. *New Engl J Med* 1975;**333**:1444–55

9 EBCTCG. Systemic treatment of early breast cancer by hormonal, cytotoxic or immune therapy. *Lancet* 1992;**339**:1–15, 71–85.

10 Baum M, Ebbs S, Brooks M, Colletta A. Biological fallout from trials of adjuvant tamoxifen in early breast cancer. In: Salmon SE, ed. *Adjuvant Therapy of Cancer*, vol VI. Philadelphia: WB Saunders, 1990:269–74

11 Schipper H, Goh CR, Wang TL. Shifting the cancer paradigm: must we kill to cure? *J Clin Oncol* 1995;**13**:801–7

12 Beral V, Hermon G, Reeves G, Peto R. Sudden fall in breast cancer death rates in England and Wales. *Lancet* 1995;**345**:1642–3